MAP08: Future Simulations of Air Quality: Are they credible?   B. Duncan (PI)

Part A (A. Fiore, A. Molod)

Motivation: HTAP showed models can't simulate present US AQ!
- ✓ **How can we believe prediction of future AQ?**
- ✓ **How can we believe HTAP's source-receptor study?**

1) Investigate ways to improve simulation of surface ozone.
- ✓ Isoprene chemistry, aerosols, deposition, etc. in GMI-framework.
- ✓ Look at multi-years to see if variation in bias.
- ✓ Explore use of "tiles" for boundary layer issues – expand to chemistry?
- ✓ Provide computationally-efficient recommendations to GFDL & GSFC CCMs.

2) Model simulations of future AQ.
- ✓ GMI – redo HTAP source-receptor analysis with improved surface ozone.
- ✓ GEOS-5-CCM – simulate 2050 AQ with and without improvements – different?

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Part B (C. Randles, P. Colarco)

Motivation: Simulate future AQ in tropics – aerosols key – more biomass burning – industrialization of India, Brazil – population growth!

- ✓ **Most GCMs impose off-line aerosol fields – only direct effects.**
- ✓ **But what about the dynamical feedbacks (semi-indirect effects) on aerosols?**

1) GEOS-5-CCM: Include dynamical feedbacks on aerosols, heating rates and aerosol microphysics (CARMA)

- ✓ Assess impact of dynamical and microphysical processes on the direct radiative forcing.
- ✓ **Use aerosol observations to assess improvement.**

2) Model simulations of future AQ.

- ✓ GEOS-5-CCM – simulate present and future AQ with and without dynamical feedbacks on aerosols. How does it impact prediction of future AQ? SSTs? etc.